FORM PTO-1390 (REV 10-2000) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER: HA01-P01

U.S. APPLICATION NO (If known, see 37 CFR 1.5): 09/673221

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/GB99/01138	14 APR 99	14 APR 98

TITLE OF INVENTION "METHOD OF MANUFACTURING TRANSDERMAL PATCHES"

APPLICANT(S) FOR DO/EO/US Mark Rupert TUCKER

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. [x] This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. [ ] This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. [x] This is an express request to promptly begin national examination procedures (35 U.S.C. 371(f)).
4. [x] The US has been elected by the expiration of 19 months from the priority date (PCT Article 31).
5. [x] A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. [x] is attached hereto (required only if not communicated by the International Bureau).
   b. [ ] has been communicated by the International Bureau.
   c. [ ] is not required, as the application was filed in the United States Receiving Office (RO/US).
6. [ ] An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
7. [ ] Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
   a. [ ] are attached hereto (required only if not communicated by the International Bureau).
   b. [ ] have been communicated by the International Bureau.
   c. [ ] have not been made; however, the time limit for making such amendments has NOT expired.
   d. [ ] have not been made and will not be made.
8. [ ] An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. [ ] An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. [ ] An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11 to 16 below concern document(s) or information included:

11. [ ] An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. [ ] An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. [x] A FIRST preliminary amendment.
    [ ] A SECOND or SUBSEQUENT preliminary amendment.
14. [ ] A substitute specification.
15. [ ] A change of power of attorney and/or address letter.
16. [x] Other items or information:

Drawings (Sheet 1 of 1)
Return Receipt Postcard
A Check in the Amount of $565.00
A Copy of First Page of International Publication WO 99/52513
PCT International Search Report
Notification of Transmittal of the International Preliminary Examination Report
PCT International Preliminary Examination Report

U.S. APPLICATION NO (if known, see 37 CFR 1.5) 09/673221	INTERNATIONAL APPLICATION NO	529 Rec'd PCT/PTO 12 OCT 2000 ATTORNEY'S DOCKET NUMBER

17. ☒ The following fees are submitted:	CALCULATIONS PTO USE ONLY
BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :	
Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO **$1000.00**	
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO **$860.00**	
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO **$710.00**	
International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) **$690.00**	
International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) **$100.00**	

ENTER APPROPRIATE BASIC FEE AMOUNT =				$	$860.00
Surcharge of **$130.00** for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				$	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	19 - 20 =	0	X **$18.00**	$	0.00
Independent claims	2 - 3 =	0	X **$80.00**	$	0.00
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ **$270.00**	$	270.00
TOTAL OF ABOVE CALCULATIONS =				$	1.130.00
☑ Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.				$	565.00
SUBTOTAL =				$	565.00
Processing fee of **$130.00** for furnishing the English translation later than ☐20 ☐30 months from the earliest claimed priority date (37 CFR 1.492(f)). +				$	
TOTAL NATIONAL FEE =				$	565.00
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00** per property +				$	
TOTAL FEES ENCLOSED =				$	565.00
				Amount to be refunded:	$
				charged:	$

a. ☒ A check in the amount of $ 565.00 to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of $_____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☐ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. _____. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:
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SIGNATURE. 12 OCT 2000

John S. Reid
NAME

36,369
REGISTRATION NUMBER

PTO/SB/ 10 (10-92)

VERIFIED STATEMENT CLAIMING SMALL ENTITY STATUS (37 CFR 1.9(f) & 1.27(c))--SMALL BUSINESS CONCERN

Docket Number (Optional)
HA01-P01

Applicant or Patentee: Mark Rupert TUCKER
Serial or Patent No.: PCT/GB99/01138 (USSN 09/673221)
Filed or Issued: (PCT)14th April 1999; US: 12 OCT 2000
Title: METHOD OF MANUFACTURING TRANSDERMAL PATCHES

I hereby declare that I am

☐ the owner of the small business concern identified below:
☒ an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF SMALL BUSINESS CONCERN STOWIC RESOURCES LIMITED
ADDRESS OF SMALL BUSINESS CONCERN Ross House, Stow-On-The-Wold, Gloucestershire GL54 1AF, Great Britain

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.12, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees to the United States Patent and Trademark Office, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention described in:

☐ the specification filed herewith with title as listed above.
☒ the application identified above.
☐ the patent identified above.

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights in the invention must file separate verified statements averring to their status as small entities, and no rights to the invention are held by any person, other than the inventor, who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person made the invention, or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d), or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization having any rights in the invention is listed below:
☒ no such person, concern, or organization exists.
☐ each such person, concern or organization is listed below.

Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING MARK TUCKER
TITLE OF PERSON IF OTHER THAN OWNER DIRECTOR
ADDRESS OF PERSON SIGNING ~~HOUSE~~ Ross HOUSE, THE SQUARE, STOW-ON-THE-WOLD, GLOS GL54 1AF
SIGNATURE Mark Tucker DATE 20/10/00

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

#4

INVENTORSHIP ..... Mark Rupert TUCKER
ATTORNEY DOCKET NO. HA01-P01
INTERNATIONAL APPLICATION NUMBER PCT/GB99/01138
INTERNATIONAL FILING DATE ..... April 14, 1999

TITLE: **METHOD OF MANUFACTURING TRANSDERMAL PATCHES**

COMMUNICATION AND PRELIMINARY AMENDMENT

To: Assistant Commissioner for Patents
Washington, D.C. 20231

From: John S. Reid (Tel. 509-534-5789; Fax 509-532-0351)
1926 S. Valleyview Lane
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COMMUNICATION AND PRELIMINARY AMENDMENT

Please amend the specification as follows: at page 1, line 1, insert the following:

--Cross Reference to Related Applications

The present application being filed herewith claims priority under 35 U.S.C. § 371 and 119 to Patent Cooperation Treaty (PCT) patent application PCT/GB99/01138, filed April 14, 1999, which in turns claims priority to British Patent Application number 9807917.1, filed in the United Kingdom on April 14, 1998.--

REMARKS

The present application being filed herewith claims priority to an earlier filed Patent Cooperation Treaty (PCT) patent application under 35 U.S.C. § 371 and 119, as indicated above.

Respectfully submitted,

Dated: 12 OCT 2000 By: _____
John S. Reid
Reg. No. 36,369

METHOD OF MANUFACTURING TRANSDERMAL PATCHES

This invention relates to a method of manufacturing transdermal patches, for example the so-called nicotine patches which can be applied to the skin of a person who wishes to receive some nicotine whilst giving up smoking.

One particularly satisfactory form of patch is disclosed in United Kingdom Patent Specification No. 2232892, where it is broadly defined as an occlusive body for the transdermal administration of a physiologically active substance, the body comprising an impermeable backing and a microporous or permeable membrane which define a cavity therebetween, said physiologically active substance being contained within said cavity in liquid form, said microporous or permeable membrane being permeable to and in contact with said physiologically active substance and the liquid material confined between said impermeable backing and said microporous or permeable membrane within said cavity being substantially immobilised by a viscous flowable gel, characterised in that either;

a) said membrane is hydrophilic and the contents of said cavity are hydrophobic; or

b) said membrane is hydrophobic and said cavity contains a hydrophilic wetting agent;

whereby, in use, passage of said physiologically active substance through said microporous membrane is rate-controlling and said physiologically active substance is released from said microporous membrane at a rate that is substantially constant over a period of hours.

Typically the occlusive body in the form of the patch has, in going from one side to the other, several layers which may include: (i) a disposable, removable protective layer, (ii) a layer of adhesive, (iii) the permeable membrane or membranes, (iv) a layer of gel

containing the physiologically active substance (such as nicotine), and (v) the layer of an impermeable backing material.

In practice the first three (or more) layers may be employed as a pre-formed laminate. It is then necessary to apply the active substance (layer (iv)) to the laminate (to the combination of layers (i) to (iii)) and then to secure the active substance in place by providing the backing layer (layer (v)).

Typically when manufacturing a product of this nature, the materials are fed horizontally and a discrete amount of the active substance is deposited at a fixed interval, or station, along the laminate, with the backing material then being brought into position in order to cover the active substance prior to the backing material being secured, for example by sealing, to the laminate in regions around the discrete amounts of active substance. The process is non-continuous and known as 'form, fill, seal' such as is demonstrated by a blister packer. It requires substantial re-tooling if volumetric changes to the reservoir are desired.

Bearing in mind that the active substance is normally present in a gel, it can be appreciated that there are considerable handling problems associated with providing the appropriate amounts of the gel at neatly spaced intervals along the laminate without the gel being exposed to the environment. Moreover, when it is wished to vary the volume of the gel, so as to vary the amount of active substance in the patch, or to vary the skin contact area of the product, (assuming that the concentration of active substance in the gel remains the same), it can be difficult to alter the machine whilst in operation so that the desired effect is achieved.

Equipment already exists for wrapping items such

as so-called telephone cards, which are cards for insertion into a telephone machine to allow the user to use the telephone for the duration of the unused units electromagnetically held in the telephone card. In such equipment a first layer of material is caused to travel vertically downwards close to, and parallel to, a second layer of material. Often one layer is transparent and the other is opaque and contains instructions and other information. The two layers of material are brought together and are sealed to each other by opposing pairs of sealing devices, e.g. heated wheels, which act on the opposing longitudinal edges of the two strips of material being brought together. In addition, an intermittent sealing mechanism acts transversely across the juxtaposed layers already joined at their opposing longitudinal edge regions, so that a pouch results. As the pouch is being formed a telephone card, or the like, is fed into the pouch which still remains open along its upper (fourth) edge. Once the card or other item is correctly located in the pouch, and while both layers continue to move downwardly, the fourth open edge of the pouch is closed, typically by the same horizontal sealing mechanism. In fact, the most efficient way of achieving this is for the upper edge of a lower pouch to be sealed at the same time as the lower edge of the immediately upper pouch is being sealed. Both sealing operations can be carried out simultaneously by the same sealing arrangement.

If desired at about the same time as the sealing is being effected to form the last transverse seal, or immediately downstream thereof or at a much later stage, the pouches can be separated from each other by cutting, or else a line of weakness can be formed in the region between the upper seal of the lower pouch and the lower seal of the upper pouch so that the

pouches are still joined in end to end relationship but with a line of weakness which can readily be ruptured.

Somewhat similar equipment can also be used for creating pouches containing other products, such as sugar or sauces (for use in restaurants).

According to a first aspect of the present invention, there is provided a method of forming a transdermal patch, which comprises the steps of:

feeding at a first linear speed a strip of materials comprising a disposable layer, a layer of adhesive and a layer of a permeable membrane;

feeding into close proximity and in face-to-face relationship with the first strip at least one second strip formed of impermeable backing material(s), at the same first linear speed;

passing the first and second strips together through a first sealing station at which at least the opposed longitudinal edge regions of the strips are secured together, optionally with intermediate regions of the strips being secured along their lengths, so as to form at least one elongate chamber;

passing the first and second strips joined at least at their longitudinal edges, through a second sealing station at which the strips are sealed to each other transversely at intervals along the strips, whereby the or each chamber becomes an open-topped pouch;

introducing a liquid containing an active substance into the pouch or pouches, once formed; and

sealing the pouches along their previously open edges so as to form completely sealed pouches.

According to a second aspect of the present invention there is provided a continuous process for forming a transdermal patch which comprises the steps

of:

continously feeding a strip of material comprising a layer of permeable membrane;

continously feeding into close proximity and in face-to-face relationship with the first strip a second strip comprising an impermeable backing material;

passing the first and second strips together through one or more filling and sealing stations in which the material containing an active substance is introduced between the strips and pouches are formed by first sealing devices which seal the strips together in a longitudinal direction of the strips and second sealing devices which seal the strips together in a transverse direction of the strips;

the size of the pouches being adjusted by adjusting the number position and/or frequency of operation of the first sealing devices and/or by adjusting the number position and/or frequency of operation of the second sealing devices.

The process is continuous as a result of the dosing and patch formation happening in a synchronised/simultaneous manner. This is distinct from the blister technique which is a station-by-station function and non-continuous.

Conveniently, at the second sealing station the upper previously open region of a pouch or pouches is sealed and the sealing simultaneously closes the bottom of the pouch or pouches immediately above the first mentioned pouch or pouches.

The method can also include a separation cutting step, in which a transverse cutting exercise takes place so as to separate one sealed pouch containing the active substance from the adjacent pouches upstream and downstream.

If a tear-tab at one corner of the patch is required, a suitable "kiss-cut" function can be

provided at this stage. In addition, other functions such as registration, embossing and de-bossing, can be performed at, or immediately after, this stage.

In addition, when the two strips are first brought together and sealed along their longitudinal edges and when there is one or more additional longitudinal seal being created intermediate the edge region seals, then there will be two or more pouches being created, and it is desirable to separate those laterally adjacent pouches at a suitable downstream station. This can be achieved by, for example, rollers acting on opposite sides of the joined strips with at least one of the rollers having a cutting edge so as to separate laterally adjacent pouches.

Preferably, when effecting the method of the present invention, a gas flushing system is employed, which can be achieved by placing a small bore tube adjacent the liquid (gel) delivery tube, which ensures that the pouch will, when sealed, effectively only contain the gel itself and the flushing gas, for example nitrogen. Alternatively, instead of employing an inert flushing gas, the filling and sealing can be effected in a "vacuum".

The sealing of the adjacent strips can be effected by opposing pairs of sealing devices (e.g. heated rollers), and the means by which the liquid (gel) containing the active substance is introduced can take the form of a tube the lower, open end of which can be at a level considerably below the axes of rotation of those sealing devices, and can be positioned at a level just above where the transverse sealers are employed which come together intermittently to provide the transverse seals across the strips at the desired spaced intervals. It will be appreciated that careful synchronisation of the different pieces of equipment which carry out the sealing and cutting steps is

required, but existing technology is readily available for this.

When it is desired to increase the active amount of substance, whilst retaining the concentration of the active substance constant in the gel, it is clearly necessary to provide a larger volume of the gel. In order to accommodate the larger volume, the pouch needs to be larger and this can be achieved in one or more ways. If, for instance, during pouch production three pouches are being produced side by side, it is possible to reduce the number of pouches to two which will increase the available width of each pouch. This is done by removing one of the pairs of sealing devices (e.g. heating rollers) and adjusting the location of the remaining intermediate pair of sealing devices; moreover, one of the dosing nozzles is removed.

Alternatively, or in addition, the timing of the transverse sealing is adjusted to take place at longer intervals with the result that longer pouches are formed.

Obviously, when the transverse sealing is less frequent during the formation of the longer pouches, it is also necessary that there is corresponding adjustment to the transverse cutting equipment so that the cutting remains along the seal which separates one sealed pouch or row of pouches from the adjacent pouch or row of pouches.

It is to be appreciated that, even when the volume of the pouch is being altered, it is possible to continue to feed in the first and second strips at the same linear feed speed. Furthermore, the two or more in-feed rolls of material do not need to be changed as part of the retooling exercise common in other manufacturing methods. In other words, the same materials and some rolls can be used without adjustment to obtain a different pouch size. In fact, it is a

great advantage of the present invention that variation in the volume of the pouch desired does not necessitate any alteration to the components responsible for feeding in the two starting strips of material. The handling of such strips is a delicate matter and it is therefore of considerable advantage to maintain the feed speeds at a constant. This is because continuous processes exert a constant pressure/strain on the materials resulting in less damage and/or distortion of the final product and a "flatter" more aesthetically pleasing pouch than intermittent ones. Indeed, intermittent or non-continuous processes such as blister packers have a stop-start motion that can cause damage by stretching the material.

It is a relatively simple matter, through the appropriate control equipment, to cause the transverse sealing components to operate at longer or shorter intervals so as to produce longer or shorter pouches, and equally it is relatively simple for the same control equipment to coordinate the components responsible for the transverse cutting without re-tooling the machine.

It has been found by experiment that the process according to the present invention can be used to manufacture pouches as small as $2cm^2$. This contrasts with the prior art processes in which a minimum pouch size of no less than $5cm^2$ was possible.

The tube or tubes, or like, responsible for injecting the gel containing the active substance into the pouches remains in the same position and injects the appropriate volume of gel into the pouch as the transverse seal is being formed or immediately after it has been formed. Accurate dosing equipment is available to ensure that precisely the desired amount of gel is deposited into each pouch and can be adjusted to compensate for an increase, or decrease, in the

volumetric requirements of the pouch in a similar way to the timing adjustment of the sealing devices.

Preferably, the materials are fed through the stations in a substantially vertical direction and the liquid containing an active ingredient is introduced into the pouch or pouches in a substantially vertical direction. However, alternatively the materials may be fed through the stations in a substantially horizontal direction whilst the liquid is still introduced in a substantially vertical direction.

For a better understanding of the present invention, and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawing, which shows a perspective view of a method in accordance with the present invention being conducted on equipment having the appropriate facilities to effect the method.

In the drawing there are shown a roll 1 of backing material in the form of a strip 2 which is drawn off from the roll 1 and passed around a tensioning roller 3, then over a guide roller 4 and another guide roller 5 and passed further downstream. Somewhat similarly, but starting from the opposite side of the equipment, there is a roll 6 of multi-layer material (of the type mentioned above) with the strip 7 of that material (e.g. in the form of a laminate) being drawn off from the roll 6 and passed around its own tensioning roller 8 and then around three guide rollers 9, 10 and 11 and downstream into the region of a "nip" 12 where it meets the strip 2. The two strips 2 and 7 pass between three pairs of sealing devices in the form of pairs of heated rollers 13, 14 and 15 which have the effect of sealing the strips 2 and 7 at their longitudinally opposing edge regions 16 and 17 and also at a central location 18, so that the region between the two strips 2 and 7 is divided into two pouches 19 and 20 which are open at

their upper and lower ends. However, as those pouches 19 and 20 travel downwardly they encounter the transverse intermittent sealing system which comprises two heated bars 21 and 22 which are generally separated from each other but intermittently are brought together to form a horizontal seal across the downwardly travelling strips 2 and 7 whereby the pouches 19 and 20 are then sealed along their lower edges, as well as their vertical edges. Not shown (for the sake of clarity) are two tubes which project into the pouches 19 and 20 with the lower end regions of the tubes being just above the heated bars 21 and 22. Adjacent those two tubes are two smaller tubes (also not shown) through which an inert gas (particularly nitrogen) under pressure is introduced into the pouches 19 and 20 to create an inert atmosphere during the dosing of the pouches by the introduction of discrete doses of gel through the main tubes into the pouches 19 and 20. When the heated bars 21 and 22 are separated the filled pouches 19 and 20 can move further downward to the position occupied by the pouches 23 and 24. It can readily be seen that the heating and sealing action of the bars 21 and 22 simultaneously seals the lower edges of the pouches 19 and 20 and the upper edges of the pouches 23 and 24. It is also to be appreciated that the strips 2 and 7 when separate and when travelling together move at the same linear speed throughout in a continuous manner. For this reason the bars 21 and 22, when acting on the strips 2 and 7, move at the same speed as those strips so that the smooth progress of those strips is not impaired.

Shown below the pouches 23 and 24 are two further pouches 25 and 26 produced immediately before the production of the pouches 23 and 24. As shown in the drawing, the lower edge of the pouches 25 and 26 is being acted on by cutting devices 27 and 28 which cut

transversely across the combined strips 2 and 7 to separate the pair of pouches 25 and 26 from the pair 29 shown below as pouches 30 and 31.

It can readily be appreciated that comprehensive equipment, such as a bandolier mechanism, can be employed to draw off the strips 2 and 7 at a uniform speed and to feed them into the sealing system consisting of the heated rollers 13, 14 and 15 at the same speed and to pass the united strips 2 and 7 through the sealing system 21, 22 and through the cutting system 27, 28 at the same uniform speed.

If longer pouches are required, it is merely necessary to cause the sealing system 21, 22 to operate for the same duration but at greater intervals and for the cutting system 27, 28 also to operate at correspondingly greater intervals. It will also readily be appreciated that the provision of the three pairs 13, 14 and 15 of heated rollers of the sealing system causes the production of two pouches 19 and 20, and that by increasing or decreasing the number of pairs of heated rollers or other sealing devices there is a corresponding increase or decrease in the number of pouches generated in side-by-side relationship.

The dosing through the tubes (not shown) of the gel containing the active substance (e.g. nicotine) can be effected by sophisticated dosing equipment which is available on the market, for example from the company Hibar Systems Limited.

Although the dosing of the gel through the tube or tubes into the pouch or pouches is effected as intermittent deposits, the supply of the inert gas through the adjacent tube or tubes to create an inert atmosphere in the pouch or pouches being formed can be effected continuously.

With suitable control equipment it will be possible, at the touch of a button, to alter the

location of the heated rollers 13, 14 and 15 thereby varying the width of the pouches and also to alter the frequency of the sealing operation of the heating components 21, 22 and cutting components 27, 28 so as to vary the length of the pouches. No re-tooling is necessary. Thus variation in the magnitude of the pouches can be effected without having to replace any of the components of the equipment by replacement components. All that needs to be varied is the location of the heated rollers 13, 14 and 15 and/or the frequency of operation of the transverse sealing system, 21, 22 and the cutting system 27, 28. If desired, the backing material can be flesh-coloured or clear on that side which is to face outwards when the patch is applied to a person. At further stages downstream, the individual pouches can be cropped to provide a 'kiss-cut' 'tear-tab' and be separately packed in their own individual wrappers and batches of the wrappers collected together in packets or other suitable containers.

CLAIMS

1. A continuous process for forming a transdermal patch, which comprises the steps of:

continuously feeding at a first linear speed a strip of materials comprising a disposable layer, a layer of adhesive and a layer of a permeable membrane;

continously feeding into close proximity and in face-to-face relationship with the first strip at least one second strip formed of impermeable backing material(s), at the same first linear speed;

passing the first and second strips together through a first sealing station at which at least the opposed longitudinal edge regions of the strips are secured together, optionally with intermediate regions of the strips being secured along their lengths, so as to form at least one elongate chamber;

passing the first and second strips joined at least at their longitudinal edges, through a second sealing station at which the strips are sealed to each other transversely at intervals along the strips, whereby the or each chamber becomes an open-topped pouch;

introducing a liquid containing an active substance into the pouch or pouches, once formed; and

sealing the pouches along their previously open edges so as to form completely sealed pouches.

2. A continuous process as claimed in claim 1, in which, at the second sealing station the previously open region of a pouch or pouches is sealed and the sealing simultaneously closes the adjacent region of the pouch or pouches immediately upstream of the first mentioned pouch or pouches.

3. A continuous process as claimed in claim 1 or 2, further including a separation cutting step in which a transverse cutting exercise takes place so as to separate one sealed pouch containing the active

substance from the adjacent pouches upstream and downstream.

4. A continuous process as claimed in any one of the preceding claims, in which a "kiss-cut" function is provided at the separation cutting step.

5. A continuous process as claimed in any one of the preceding claims, in which the two strips are first brought together and sealed along their longitudinal edges and separately or simultaneously one or more additional longitudinal seals are created intermediate the edge region seals thereby creating two or more laterally adjacent pouches across the width of the strips.

6. A continuous process as claimed in claim 5, in which the laterally adjacent pouches are separated in a longitudinal cutting step in which rollers, at least one of which has a cutting edge, act on opposite sides of the join strips, so as to separate the laterally adjacent pouches.

7. A continuous process as claimed in any one of the preceding claims, further comprising a gas flushing step in which the or each pouch is flushed with gas prior to and/or during the step in which liquid is introduced.

8. A continuous process as claimed in claim 7, in which in the gas flushing step, a small bore tube is placed adjacent the liquid delivery tube and flushing gas is ejected from the tube directly into the pouch.

9. A continuous process as claimed in any one of the preceding claims, in which the filling and sealing steps are effected at a pressure lower than atmospheric pressure.

10. A continuous process as claimed in any one of the preceding claims, in which the sealing of adjacent strips is effected by opposing pairs of longitudinal or transverse sealing devices.

11. A continuous process as claimed in claim 10, in which the means by which the liquid containing the active substance is introduced takes the form of a filling tube which is inserted into the or each pouch.

12. A continuous process as claimed in claim 11, in which the lower end of the filling tube is at a level considerably below the axis of rotation of the sealing devices.

13. A continuous process as claimed in claim 10 or 11, in which the filling tube is positioned at a level just above where the transverse sealing devices are disposed.

14. A continuous process as claimed in any one of claims 10 to 13, further comprising the step of adjusting the number of pouches being produced side by side, the step comprising adding or removing one or more pairs of longitudinal sealing devices and adjusting the location of the intermediate sealing devices.

15. A continuous process as claimed in any one of claims 10 to 14, further comprising the step of adjusting the size of the pouches, the step comprising adjusting the timing of transverse sealing devices, thereby changing the length of the pouches.

16. A process as claimed in any one of the preceding claims, in which the size of the pouches is not less than $2cm^2$.

17. A continuos process as claimed in any one of the preceding claims, in which the strips are fed in a substantially vertical direction and the liquid containing an active ingredient is introduced into the pouch or pouches in a substantially vertical direction.

18. A continuous process as claimed in any one of claims 1 to 16, in which the strips are fed in a substantially horizontal direction and the liquid containing an active ingredient is introduced into the

pouch or pouches in a substantially vertical direction.

19. A process substantially as described herein with reference to the accompanying drawings.

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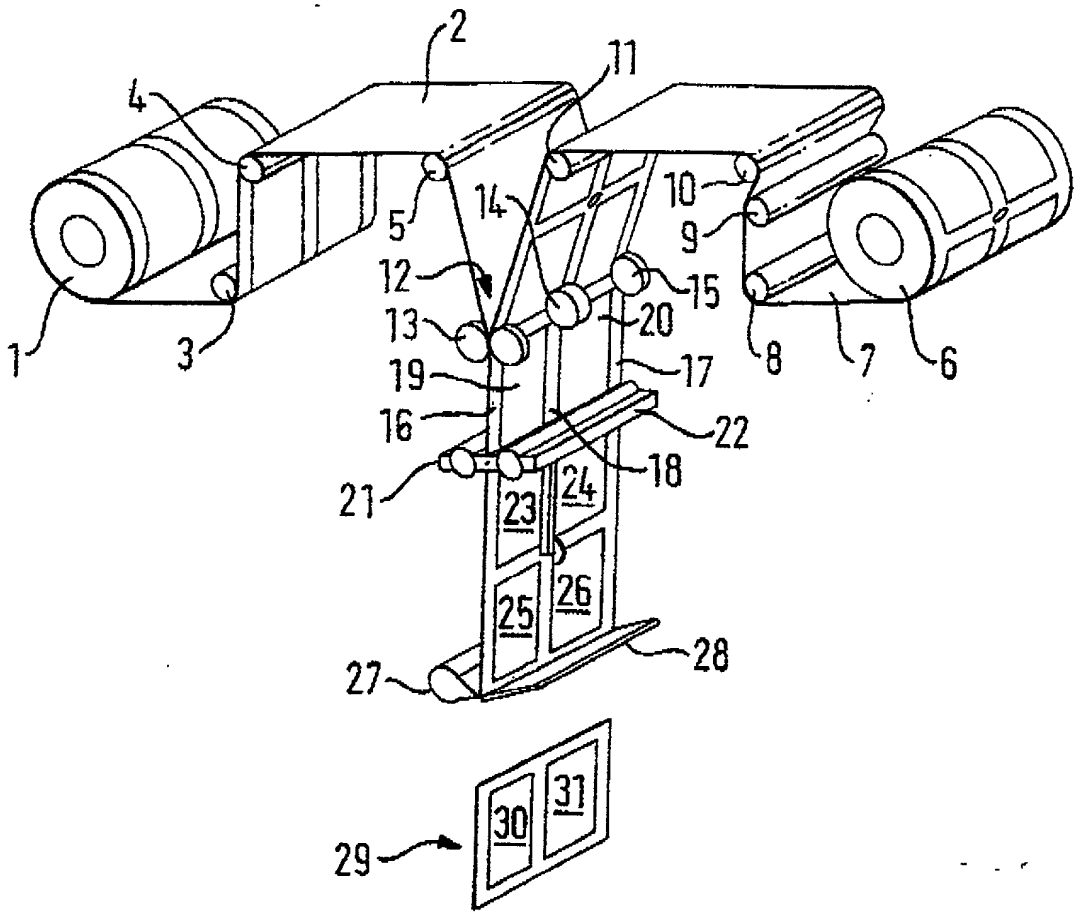
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TITLE: METHOD OF MANUFACTURING TRANSDERMAL PATCHES

COMMENTS:

DECLARATION FOR PATENT APPLICATION CLAIMING PRIORITY ON PRIOR FILED FOREIGN APPLICATIONS

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled: METHOD OF MANUFACTURING TRANSDERMAL PATCHES, the specification of which was filed on 14th April 1999 as Application Serial No. PCT/GB99/01138.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims.

I do not know and do not believe that the invention was ever known or used in the United States of America before my invention thereof.

I do not know and do not believe that the invention was ever patented or described in any printed publication in any country before my invention thereof or more than one year prior to this application.

I do not know and do not believe that the invention was in public use or on sale in the United States of America more than one year prior to this application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

INVENTORSHIP Mark Rupert TUCKER
ASSIGNEE Stowic Resources Limited
SERIAL NO. 09/673,221
FILED October 12, 2000
PRIORITY DOCUMENT PCT/GB99/01138
ATTORNEY DOCKET NO. HA01-P01
TITLE: **Method of Manufacturing Transdermal Patches**

Assistant Commissioner for Patents
Washington, D.C. 20231

POWER OF ATTORNEY

The undersigned, being the assignee of the full right, title and interest in the invention titled "Method of Manufacturing Transdermal Patches", for which an application for a United State patent was filed on October 12, 2000 as U.S. Patent Application Serial No. 09/673,221, hereby appoint the following attorney to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: John S. Reid, Reg. No. 36,369, located at 1926 South Valleyview Lane, Spokane, WA 99212-0157, telephone Area Code (509) 534-5789, facsimile (509) 532-0351.

Please direct all inquiries to John S. Reid at the above address and telephone number.

Assignee: Stowic Resources Limited

By: _____
Mark Rupert TUCKER
Director

Date: 2/11/00

PRIOR FOREIGN APPLICATION(S):

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign applications for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Serial Number: 9807917.1

Country: Great Britain

Day/Month/Year Filed: 14th April 1998

Priority Claimed Under 35 USC §119 Yes

POWER OF ATTORNEY:

As a named Inventor, I hereby appoint the following attorneys and agent to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: John S. Reid, Reg. No. 36,369.

Send correspondence to: REIDLAW, L.L.C., 1926 S. Valleyview Lane, Spokane, WA 99212-0157. Direct telephone calls to: John S. Reid at (509) 534-5789 (fax: (509) 532-0351).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful

false statement may jeopardize the validity of the application or any patent issued therefrom.

* * * * * * * * * * *

Full name of sole inventor: Mark Rupert TUCKER

Inventor's Signature: _____

Date: 20/10/00

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